

CHAPTER 10

Noise

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Noise, by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, sound levels that would go unnoticed in a highly urban or industrial environment outside the Tahoe Basin are likely to be considered noise, and have the potential to negatively impact human health, community ambiance, recreational experience, and wildlife behavior.

Based on data from previous research, primary drivers of noise levels in the Basin have been attributed to anthropogenic activities and actions. Specifically, noise levels from transportation corridors and the airport have been identified as the main sources. In an effort to address noise level impacts to both wildlife and visitors, the *Bi-State Compact* established carrying capacities for noise in the form of adopted Threshold Standards. These Noise Threshold Standards are characterized as Numerical Standards.

The following provides an assessment of current noise level conditions and trends relative to adopted Threshold Standards for the Basin (Table 10-1). The evaluation analyzes two indicator reporting categories for noise; Single Noise Events, which include aircraft and motorized watercraft associated noise; and Cumulative Noise Events. The Threshold Standards for each indicator are based on Numerical Standards, using the A-weighted Decibel (dBA) as the unit of measure. A-weighting is commonly used for the measurement of environmental and industrial noise, and when assessing potential hearing damage and other noise health effects at all sound levels. One adopted Policy Statement directing the governing board to adopt noise standards for transportation corridors was also evaluated, and was determined to be implemented (i.e., in attainment with Threshold Standard).

Table 10-1. TRPA adopted and recommended Threshold Standards for noise¹.

Indicator Reporting Category	Name of Standard	Standard Type	Adopted TRPA Threshold Standard for Noise and Recommended CNELs for Transportation Corridors ¹		Unit of Measure
Single Noise Events	Aircraft	Numerical	80 dBA (Between the hours of 8 a.m. and 8 p.m.)	Monitoring distance of 6,500 m – start of takeoff roll	Decibel Level (dBA)
				Monitoring distance of 2,000 m – runway threshold approach	
			77.1 dBA (Between the hours of 8 p.m. and 8 a.m.)	Monitoring distance of 6,500 m – start of takeoff roll	Decibel Level (dBA)
				Monitoring distance of 2,000 m – runway threshold approach	
	Watercraft (Pass-By Test)	Numerical	82 L _{max}	Monitoring distance of 50 ft. – engine at 3,000 rpm	Decibel Level (dBA)
	Watercraft (Shoreline Test)	Numerical	75 L _{max}	Monitoring distance of 5 ft. above water, 2 ft. above curve of shore, dock or platform. Watercraft in Lake, no minimum distance	Decibel Level (dBA)
	Watercraft (Stationary Test)	Numerical	88 dBA L _{max} for boats manufactured after January 1, 1993	Monitoring distance of 3.3 ft. from exhaust outlet – 5 ft. above water	Decibel Level (dBA)
			90 dBA L _{max} for boats manufactured after January 1, 1993		
	Motor Vehicles Less Than 6,000 GVW	Numerical	76 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
			82 dBA - Greater than 35 mph		
	Motor Vehicles Greater Than 6,000 GVW	Numerical	82 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
			86 dBA - Greater than 35 mph		

¹ Consistent with the Policy Statement Standard in Resolution 82-11, Community Noise Equivalent Levels (CNEL) identified for Transportation Corridors have been adopted for Transportation Corridors in the Land Use Element of TRPA (1986) - Goals and Policies.

	Motorcycles	Numerical	77 dBA - - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
			86 dBA - Greater than 35 mph		
	Off-Road Vehicles	Numerical	72 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
			86 dBA - Greater than 35 mph		
	Snowmobiles	Numerical	82 - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
	Cumulative Noise Events	Critical Wildlife Habitat Areas	Numerical	Background noise shall not exceed a CNEL of 45	
Wilderness and Roadless Areas		Numerical	Background noise shall not exceed a CNEL of 45		Decibel Level (dBA)
Low Density Residential Areas		Numerical	Background noise shall not exceed a CNEL of 50		Decibel Level (dBA)
Rural Outdoor Recreation Areas		Numerical	Background noise shall not exceed a CNEL of 50		Decibel Level (dBA)
High Density Residential Areas		Numerical	Background noise shall not exceed a CNEL of 55		Decibel Level (dBA)
Commercial Areas		Numerical	Background noise shall not exceed a CNEL of 60		Decibel Level (dBA)
Hotel/Motel Areas		Numerical	Background noise shall not exceed a CNEL of 60		Decibel Level (dBA)
Industrial Areas		Numerical	Background noise shall not exceed a CNEL of 65		Decibel Level (dBA)
State Routes 89, 207, 28, 267 and 431 (Transportation Corridors) ¹		Numerical	Background noise shall not exceed a CNEL of 55		Decibel Level (dBA)
South Lake Tahoe Airport (Transportation Corridor) ¹		Numerical	Background noise shall not exceed a CNEL of 60		Decibel Level (dBA)
US Highway 50 ¹		Numerical	Background noise shall not exceed a CNEL of 65		Decibel Level (dBA)

Source: TRPA Resolution 82-11: <http://www.trpa.org/documents/docdwnlds/goals.pdf>

Single Noise Events

A noise event can be defined as “an unexpected increase in acoustics.” Single Noise Event Threshold Standards adopted by TRPA are based on the numerical value associated with the maximum measured level in acoustical energy during an event. This is referred to as the L_{\max} of the event. Because both people and wildlife can be negatively affected by loud events from specific sources, the establishment of one Single Noise Event Threshold Standard was not possible. Accordingly, TRPA adopted several Single Noise Event Threshold Standards for noise sources identified as creating the greatest amount of noise. The *Bi-State Compact* identified these noise sources as aircraft, motorized watercraft, motor vehicles, motorcycles, off-road vehicles, and snowmobiles (Table 10-1).

This section focuses on single noise events generated from aircraft and motorized watercraft. Other Threshold Standards have been adopted for this Indicator Reporting Category including motor vehicles, motorcycles, off-road vehicles, and snowmobiles. However, due to insufficient data, these were not evaluated. Generally, TRPA adopted Noise Threshold Standards for these noise sources are the same as those adopted by state and local jurisdictions, and represent noise levels from properly maintained and unmodified equipment. Primary factors influencing single noise event exceedances for these sources of noise include modified exhaust systems, engine type, and user behavior.

The following section provides an evaluation of the status and trends of the “Shoreline Test” for motorized watercraft, and aircraft “80 dBA Departures/Arrivals (Between the hours of 8 a.m. and 8 p.m.)” Single Noise Event Threshold Standards only. The “Shoreline Test” approach is one of three approaches related to motorized watercraft-generated single events. Evaluations of the other two watercraft monitoring approaches, the Pass-By and Stationary Test, are not included in this report due to insufficient data. The “80 dBA Departures/Arrivals (Between the hours of 8 a.m. and 8 p.m.)” Threshold Standard is one of two Threshold Standards related to aircraft single events. An evaluation of the other Threshold Standard, “77 dBA Departures/Arrivals (Between the hours of 8 p.m. and 8 a.m.)” is not included in this report due to insufficient data. Due to factors such as small sample size, and the number of indicators evaluated, the status for the Single Noise Events Indicator Reporting Category displays current conditions to be somewhat worse than the established standard, there is insufficient data to determine trend, and confidence in status and trend was determined to be low (Figure 10-1).

Overall Status and Trend of the Single Noise Events Indicator Reporting Category

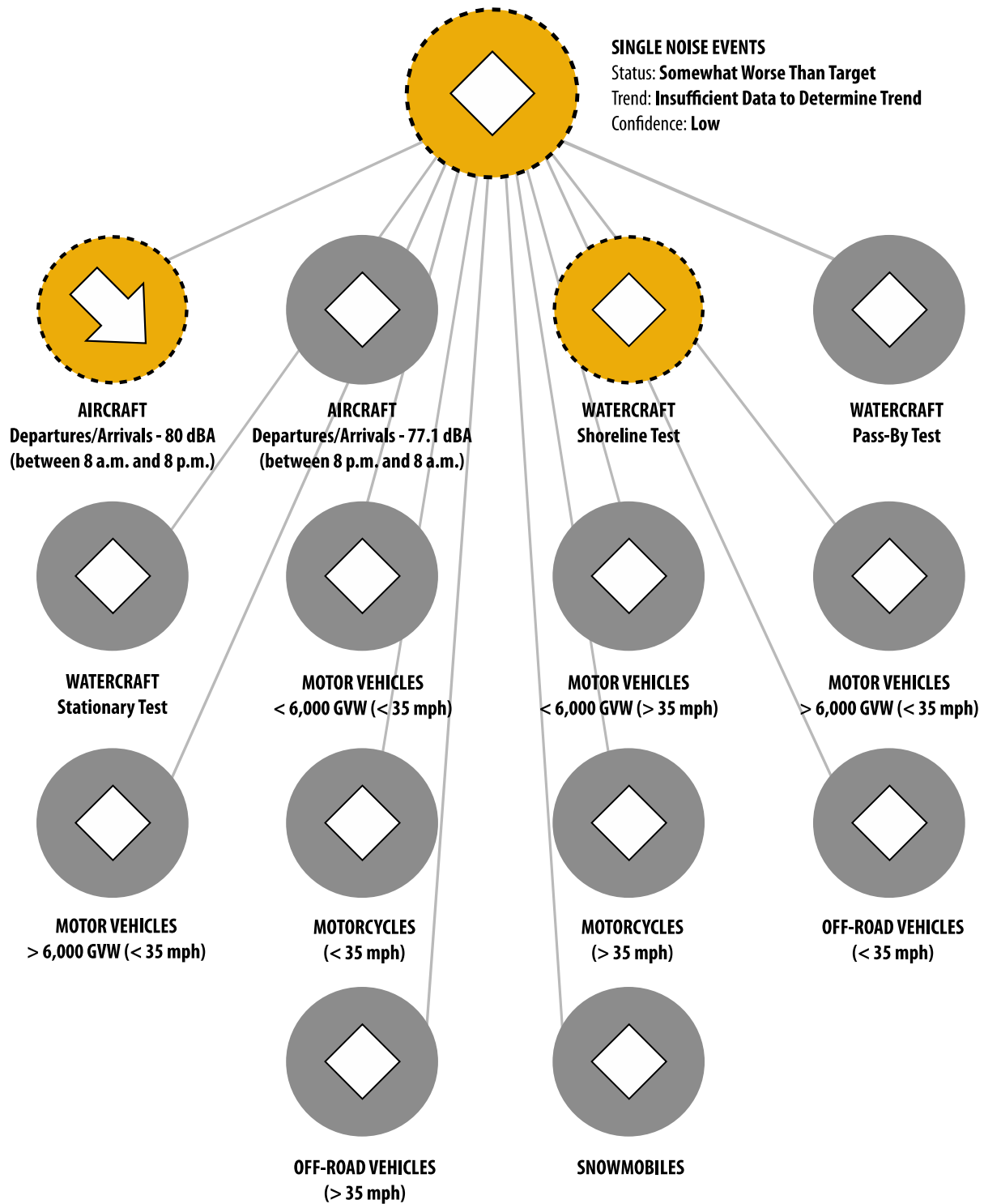
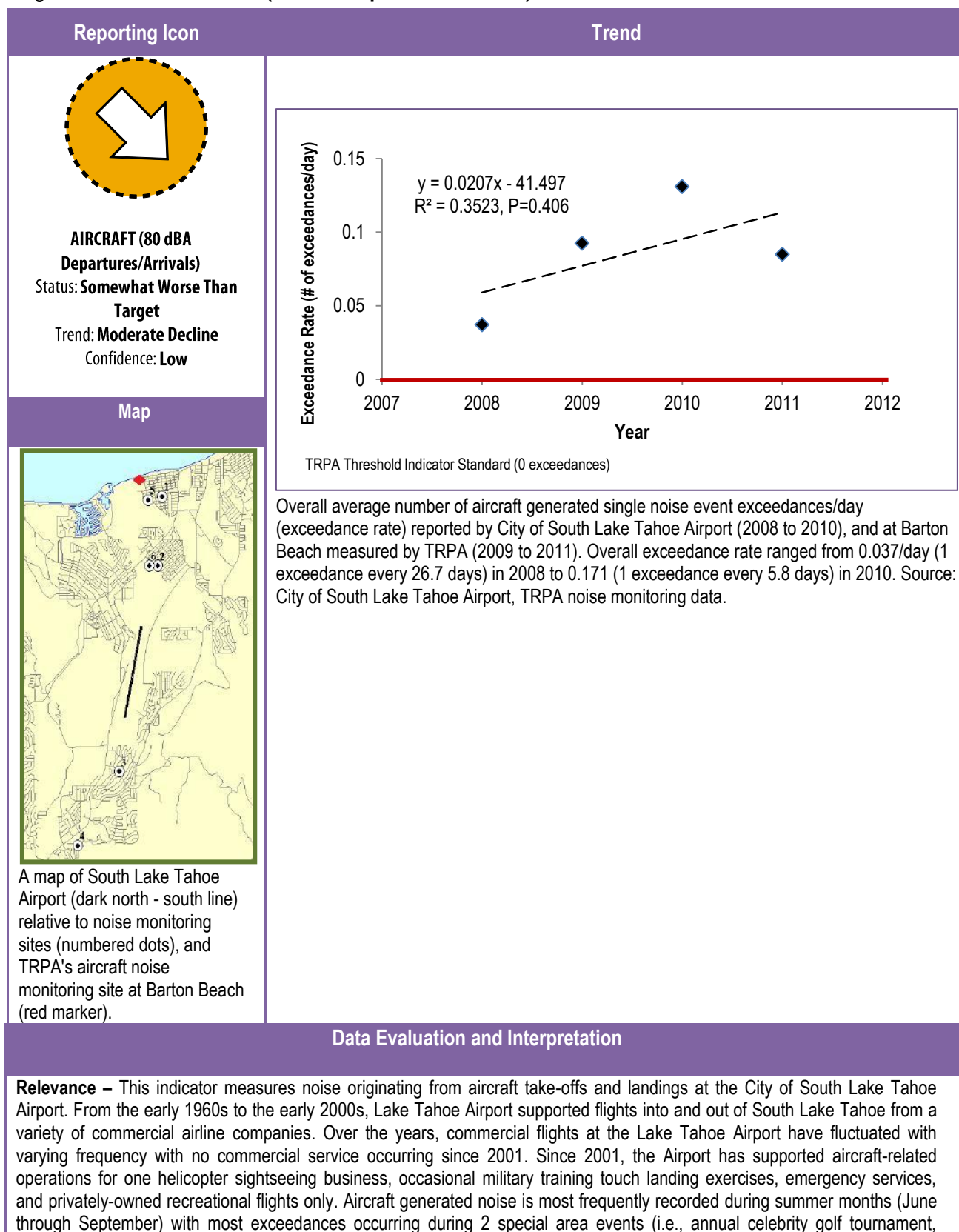


Figure 10-1. Reporting icons for the fourteen indicators in the Single Noise Events Indicator Reporting Category. Results from two of the indicators (for which data existed) were evaluated and aggregated to determine the overall status of the Single Noise Events Indicator Reporting Category (top).

Single Noise Events: Aircraft (80 dBA Departures/Arrivals)



annual air show). Single Noise Event Threshold Standards adopted by TRPA were established to protect quality of life for residents and visitor, and to reduce noise-related impacts to wildlife.

Threshold Category – Noise

Indicator Reporting Category – Single Noise Event, Aircraft

Adopted Standards – During the hours of 8 a.m. and 8 p.m. single noise events generated by aircraft shall not exceed 80 dBA L_{max} (maximum decibel level in a single event) for arrivals and departures. During the hours of 8 p.m. and 8 a.m., the single event standard shall not exceed 77 dBA L_{max} for aircraft arrivals and departures.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – A-weighted Decibel (dBA)

Status – Between 2008 and 2010, The South Lake Tahoe Airport regularly provided quarterly and annual airport noise reports to TRPA (CSLT 2008; CSLT 2009; CSLT 2010). These reports documented the number of single noise events exceedances by aircraft recorded at any of the six Lake Tahoe Airport noise monitoring locations. Based on data from the Airport, single noise events for aircraft were out of attainment with the no-exceedance standard for each year noise monitoring was conducted by the Airport (2008-2010), recording 82 exceedance in 2008 (mean = 13.7/monitoring site), 218 exceedances in 2009 (mean = 36.3/monitoring site), and 200 exceedances in 2010 (mean = 33.3/monitoring site). The average daily per monitoring site rate of exceedances at sites monitored by the Airport was 0.037 exceedances per day (1 exceedance every 26.7 days) in 2008, 0.099 exceedances per day (1 exceedance every 10 days) in 2009, and 0.091 exceedances per day (1 every 10.9 days) in 2010. noise monitoring conducted by TRPA at an additional site outside the Airport monitoring program from 2009-2011, observed 3 exceedances in 2009, 7 exceedances in 2010, and 5 exceedances in 2011 (TRPA 2011c). The average daily rate of exceedances at the site monitored by TRPA was 0.086 exceedances per day (1 exceedance every 11.7 days) in 2009, 0.171 exceedances per day (1 exceedance every 5.8 days) in 2010, and 0.085 exceedances per day (1 every 11.8 days) in 2011. Overall, the exceedance rate for the Airport averaged 0.095 exceedances per day or 1 exceedance every 12.8 days (equal to 35.8 days/year). Based on the most current results from TRPA monitoring efforts (2011), noise standards were exceeded on average 29.4 days/year or 6.8% of the days within a year), the Region was determined to be “somewhat worse than target.”

Trend – Trend in overall exceedance rate was determined to be “moderate decline” based on combined data collected at Barton Beach and Airport sites (2008 to 2011). A simple linear regression test indicated that trend in exceedance rate calculated from airport monitoring effort showed an increasing trend of 0.59/day/year, however, this trend was not statistically significant (Airport - $R^2=0.638$, $P = 0.411$). There was no trend in exceedance rate recorded at the Barton Beach site ($R^2=0.25$, $P=0.667$). The trend in overall average exceedance rate (exceedance rate averaged over all monitoring sites between 2008 and 2011) indicated an increase in exceedance rate of 0.021/day/year. However this was not statistically significant ($R^2=0.352$, $P=0.406$) probably due to small sample size ($n=4$ years) and inter-annual variation in exceedance rate.

Confidence

Status – There is “moderate” confidence in the current status because although TRPA data were collected according to methods prescribed in TRPA’s Shorezone Noise Monitoring Program (and reviewed by a noise expert), procedures for the Airport Monitoring Program are different than those used by TRPA. TRPA noise monitoring equipment is regularly calibrated, and sample design and effort is documented (TRPA 2009).

Trend – The confidence in the trend in overall exceedance rate for all sites combined was determined to be “low” because the R^2 value was less than 0.5 and the P value was greater than 0.4 per rules established for this evaluation (see Methodology chapter).

Overall Confidence – The overall confidence was determined to be “low” because there was low confidence in the trend determination.

Interim Target – Based on the current trend of this indicator, it is predicted that the exceedance rate will increase. However, by the next evaluation period, the interim target is expected to demonstrate a flattening in trend as a result of TRPA and other partners’ efforts to work with the airport to find solutions to mitigate Noise Threshold Standard exceedances.

Target Attainment Date – Based on the current trend of this indicator, a target attainment date for Threshold Standard attainment cannot be accurately estimated.

Human & Environmental Drivers – The primary factors influencing single noise event exceedances are aircraft type and frequency of flight (California Department of Transportation 2007). Additional factors influencing aircraft noise levels include wind, temperature, cloud cover, fog, topography, vegetation and man-made barriers such as homes and other buildings. Thermal inversions, a common occurrence in the Basin (TIMMS 2011a), have the same effect on noise as does cloud cover (California Department of Transportation 2007).

Monitoring Approach – Lake Tahoe Airport monitored noise at six sites in the vicinity of the Airport (see map above) following an approved monitoring protocol. In order to match noise events to aircraft operations, radio transmissions between air traffic controllers in the air traffic control tower are matched to the noise event by date and time. All exceedances are documented and categorized in quarterly and annual noise reports to TRPA. The Barton Beach aircraft noise monitoring site was located in the

shorezone of Lake Tahoe, approximately 0.2 miles from Lake Tahoe Airport. While the Airport monitoring sites generally have the ability to document aircraft noise on a year-round basis, data recorded at the Barton Beach site was limited to June through September, sampling a total of 135 days (approximately 3,240 hours). All exceedances at the Barton site were individually reviewed and analyzed by a trained noise technician.

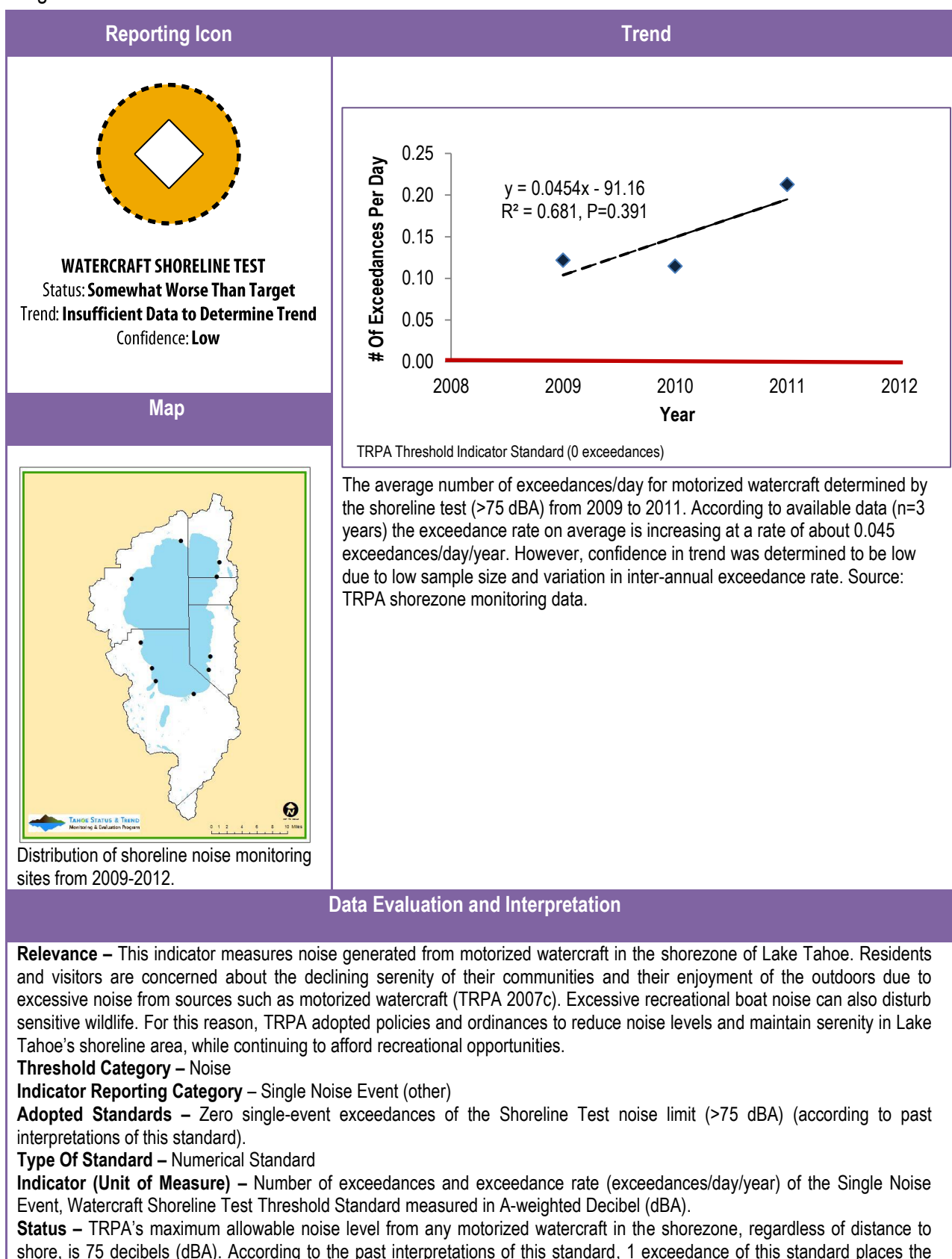
Monitoring Partners – City of South Lake Tahoe and TRPA. The California Tahoe Conservancy provided access to their lands for monitoring.

Programs and Actions Implemented to Improve Conditions – TRPA has adopted aircraft type limitations for the Lake Tahoe Airport based on tested arrival and departure decibel levels. TRPA has also established Noise Threshold Standards for arrival and departures, depending on time of day/night. The City of South Lake Tahoe has published noise abatement guidelines for all pilots located on the South Lake Tahoe Airport website.

Effectiveness of Programs and Actions – Existing programs do not appear sufficiently effective at achieving adopted Threshold Standards based on the evaluation of available data.

Recommendation for Additional Actions – Further noise mitigation measures may be necessary to achieve existing zero exceedance aircraft Noise Threshold Standards. For example, further restricting aircraft type, flight frequency and/or the time of day aircraft are allowed to take-off and land may aid in mitigating aircraft noise. Alternatively, an investigation may be necessary to determine if existing Threshold Standards are achievable given today's aircraft noise-reduction technologies (i.e., the types of aircraft using the airport may not be capable of achieving adopted noise standards). Although there is an established monitoring plan for single noise events for aircraft at the Lake Tahoe Airport, discrepancies of applicable Threshold Standards exist between the City of South Lake Tahoe and TRPA (i.e., 77 dBA L_{max} vs. 80 dBA L_{max}). In order to obtain higher confidence in status and trend evaluation, monitoring of aircraft needs to be standardized between monitoring parties.

Single Noise Events: **Watercraft Shoreline Test**



Region in “non-attainment” with the adopted Threshold Standard. Measurement of noise levels in the shorezone from 2009 to 2011 documented exceedances of the motorized watercraft shoreline test Threshold Standard in each monitoring year and therefore, according to previous interpretation of Threshold Standard compliance, the Region is in non-attainment with the zero exceedance Threshold Standard. Monitoring efforts documented that motorized watercraft were responsible for 47 of 301 (16%) recorded shorezone exceedances in 2009 (0.12 exceedances/day; 1 exceedance every 8.2 days, n=386), 51 of 446 (11%) recorded exceedances in 2010 (0.11 exceedances/day; 1 exceedance every 8.7 days, n=446), and 91 of 458 (20%) recorded exceedances in 2011 (0.21 exceedances/day; 1 exceedance every 4.7 days, n=428) (TRPA 2011c). When placed in context of the total number of boat trips undertaken over the same time period, data from boating surveys conducted in 2009, 2010, and 2011, indicate that 203,821, 188,047, and 193,540 boat trips occurred in those years, respectively. Within that context, TRPA recorded noise exceedances from boats in 0.0002% to 0.0005% of the trips undertaken, or a greater than 99.999% Threshold Standard compliance rate. Although the Region is not achieving the zero exceedance Threshold Standard, when viewed in context of the number of boat trips recorded over the same time period, it suggests that the Region is “somewhat worse than target.”

Trend – Although a simple linear regression model estimated that the exceedance rate is increasing at a rate of 0.045 exceedance/day/year, the trend in the noise standard exceedance rate was given the category “insufficient data to determine trend” based on the limited monitoring record (2009 to 2011). The relationship between exceedance rate and time was not statistically significant ($R^2=0.681$, $P=0.391$), and likely the result of small sample size (n=3 years).

Confidence –

Status – There is a “high” degree of confidence in status because of noise monitoring protocol (SAE 1970), unit accuracy, data integrity, and spatial representativeness of monitoring sites.

Trend – According to methods for determining confidence in trend for this evaluation, the trend was determined to be “moderate” in exceedance rate because the probability of the trend occurring by chance was less than 0.4 and greater than 0.1 (i.e., there is 60.9% certainty that the trend is occurring). However, due to the small sample size (only 3 years sampled) and inter-annual variability in exceedance rate, confidence in trend is more appropriately classified as “low” with nearly a 40% probability that there is no trend (or little or no change).

Overall Confidence – The overall confidence in the status and trend was determined to be “low” because there was a “low” confidence determination for trend and “high” confidence determination for status. More monitoring efforts are needed to improve confidence.

Interim Target – Although determined to have a statistically insignificant linear relationship, the current trend of this indicator is toward increase (a predicted exceedance rate of 0.44 is expected by 2016). However, more focused watercraft patrols to enforce the 600’ no-wake ordinance should result in a declining trend in exceedance rate by the next evaluation. Thus, an interim target cannot be accurately predicted.

Target Attainment Date – Due to an insufficient number of data points, and the inter-annual variability in exceedance rate, it was not possible to accurately estimate an attainment date for this indicator.

Human & Environmental Drivers – Watercraft-generated single-event noise exceedances are driven by the type of watercraft engine and exhaust system (Lanpheer 2000) and boater behavior (proximity to shore, operating speed, etc.). Shoreline topography and wind can potentially also influence noise levels.

Monitoring Approach – Watercraft-generated noise levels are measured annually at ten shorezone monitoring locations for five to six sampling periods (ranging from 4 to 12 days) from May through September. Sampling periods are comprised of both weekend and weekdays, allowing for analysis of the differences in noise levels or exceedances between days in the week. The monitoring periods include low, medium, and high watercraft use times throughout the day (7a.m.-7p.m.). All noise events are individually analyzed and categorized by a trained noise technician.

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the California Tahoe Conservancy, U.S. Forest Service, California Department of Parks and Recreation and Nevada Division of State Parks.

Programs and Actions Implemented to Improve Conditions – TRPA’s Watercraft Patrol team enforces a 600 ft. “no-wake zone” regulation for the shore zone, which works to reduce shoreline noise levels.

Effectiveness of Programs and Actions – The existing program or action has not achieved total compliance (i.e., zero exceedances) with adopted Threshold Standards based on the status and trend evaluation of available data.

Recommendation for Additional Actions – The conditions for this indicator could potentially improve with an increased level of enforcement for the 600 ft. “no-wake zone” shorezone regulation. TRPA could also re-enact a prohibition on boats operating in the Lake that have working, aftermarket exhaust bypass systems. However, this rule was invalidated by a Court decision in 2008.

Cumulative Noise Events

Cumulative noise or Community Noise Equivalent Level (CNEL) is a noise measurement based on a weighted average of all measured noise over a 24-hour period. The CNEL indicator applies a +4.77 dB “penalty” or weight to noise levels during the evening period (7 p.m. to 10 p.m.) and a +10 dB penalty to noise levels during the nighttime period (10 p.m. to 7 a.m.) to account for people’s increased sensitivity to nighttime noise. TRPA adopted CNEL standards for different zones within the Basin to account for expected levels of serenity. Zones included TRPA Plan Areas, land use categories and transportation corridors (Table 10-1).

Depending upon the land use category, adopted CNEL standards range from 45 dBA (e.g., critical wildlife habitat and wilderness areas) to 65 dBA (e.g., highway corridors). For ease of understanding, the following comparisons provide a generalized practical indication of common sounds to which these standards can be compared:

40 dBA	Residential area with soft radio music
50 dBA	Open office area background level
60 dBA	Normal conversational speech at 5-10 feet
70 dBA	Small air compressor at 50 feet
80 dBA	Sports car interior at 60 mph
90 dBA	Industrial boiler room

In previous Threshold Evaluations, the number of land use types sampled to characterize Regional CNEL was limited, and the CNEL evaluation was typically based on a single 24-hour sampling effort. In 2011, the monitoring protocol was modified: multiple plan areas within each individual land use category and transportation corridor were measured over several 24-hour periods to determine attainment status by land use category. This monitoring approach was selected based on recommendations from previous CNEL noise studies and TRPA attempts to increase the statistical rigor and confidence in CNEL monitoring in the Region.

The following section provides an evaluation of the current status and trends for the CNEL noise indicator. It includes an evaluation of the status of 16 adopted TRPA Threshold Standards for CNEL. Evaluations of these indicators were grouped by Numerical Standard or maximum allowable CNEL value for a specific area. In general, indicators for the Cumulative Noise Events Indicator Reporting Category indicate that the Regional status is somewhat worse than the established target, there was little or no change in trend, and confidence in status and trend was determined to be low to moderate (Figure 10-2).

Overall Status and Trend of the Cumulative Noise Events Indicator Reporting Category

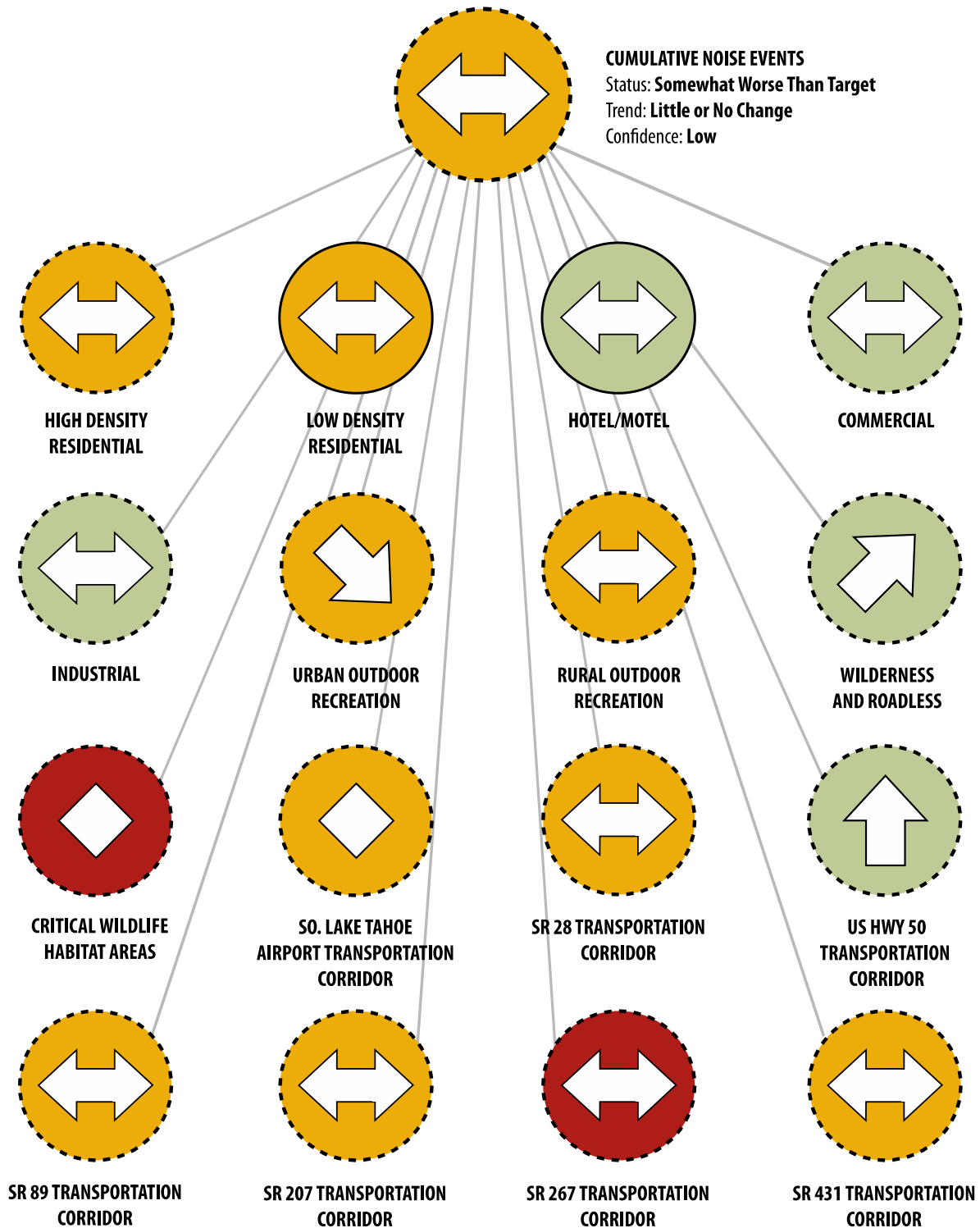
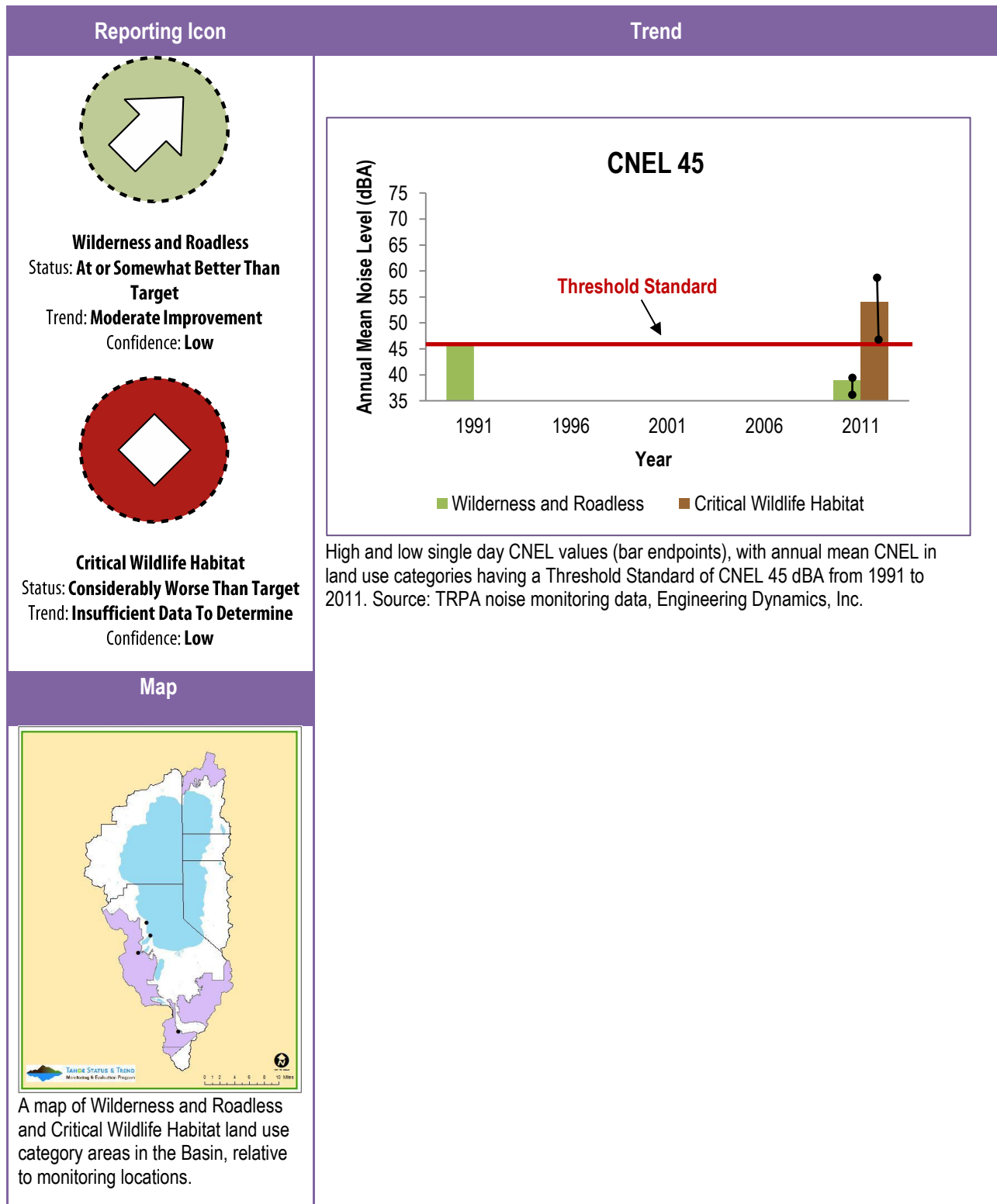


Figure 10-2. Reporting icons for the sixteen indicators evaluated in the Cumulative Noise Events Indicator Reporting Category. Results from each of the sixteen indicators (bottom) were evaluated and aggregated to determine the overall status of the Cumulative Noise Events Indicator Reporting Category (top).

Cumulative Noise Events: Wilderness and Roadless & Critical Wildlife Habitat Areas (CNEL 45 dBA)



Data Evaluation and Interpretation

Relevance – This indicator measures 24-hour noise levels in the Wilderness and Roadless and Critical Wildlife land use categories in the Lake Tahoe Basin. Noise by definition is “unwanted sound” and is therefore a subjective reaction to acoustical energy or sound levels. In recent years, visitors to and residents of the Lake Tahoe Basin have expressed concerns about the decline in serenity of their community and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007c). Excessive noise levels, specifically in wilderness and critical wildlife habitat areas, can be especially disruptive in environmentally sensitive natural areas. Agencies in the Basin have adopted specific restrictions and Threshold Standards to protect sensitive wildlife habitat, and have identified this unique fauna on a Special Interest Species list. In addition to existing federal, state, and local noise control regulations to address impacts of noise on both wildlife and people, the Tahoe Regional Planning Agency adopted Community Noise Equivalent Levels (CNEL) for all land use categories in the Basin.

Threshold Category – Noise

Indicator Reporting Category – Cumulative Noise Events-CNEL of 45 dBA, Wilderness and Roadless & Critical Wildlife Habitat Areas

Adopted Standards – For the Wilderness/Roadless and Critical Wildlife Habitat land use category, noise levels shall not exceed a CNEL of 45 dBA.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – Number of exceedances of the Wilderness/Roadless and Critical Wildlife Habitat land use category CNEL (A-weighted Decibel (dBA)). The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Status – Wilderness and Roadless – The Wilderness and Roadless land use category was previously reported in “non-attainment” in 1991 (46 dBA) (Engineering Dynamics 1991). In 2011, an annual mean CNEL value of 38.5 dBA was measured, ranging from 38 to 39 dBA (TRPA 2011d). A status of “at or somewhat better than target” was determined because it was 13% better than the adopted standard.

Status – Critical Wildlife Areas – In 2011, an annual mean CNEL value of 54 dBA (range 46 to 58 dBA) for critical wildlife areas was measured (TRPA 2011d). A status of “considerably worse than target” was determined because the indicator was 29% worse than the adopted Threshold Standard.

Trend – Wilderness and Roadless – This land use category has only been measured once in 1991 when it was determined that CNEL was 46 dBA. Change in CNEL for the wilderness and roadless areas land use category between 1991 and 2011 was -0.35 dBA/year or -0.8% indicating a trend determination of “moderate improvement.”

Trend – Critical Wildlife Areas – No CNEL data has been collected or reported prior to 2011 for the Critical Wildlife Habitat land use category. Consequently, it was not possible to characterize change in CNEL for this land use category; the trend was determined to be “unknown” because there was “insufficient data to determine trend.”

Confidence –

Status – Even though 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) additional sampling effort was deployed in 2011, a documented and peer-reviewed protocol for CNEL monitoring does not exist. Consequently, the confidence in the status was determined to be “moderate,” and the spatial and temporal characterization of CNEL across these land use types.

Trend – The confidence in the trend for both land use categories was determined to be “low” due to insufficient available data and inconsistent monitoring of this indicator.

Overall Confidence – The overall confidence for the Wilderness and Roadless and Critical Wildlife Habitat land use categories was determined to be “low” because there is “medium” confidence in status and “low” confidence in trend.

Interim Target – The Wilderness and Roadless land use category indicator is currently in attainment with Threshold Standards and therefore not necessary to establish an interim target. Due to an insufficient amount of data, an interim target for the Critical Wildlife Habitat land use category indicator was unable to be determined.

Target Attainment Date – The Wilderness and Roadless land use category indicator is currently in attainment with Threshold Standards and therefore, it is not necessary to establish an interim target date. Due to insufficient data, an interim target date for the Critical Wildlife Habitat land use category indicator was unable to be determined.

Human & Environmental Drivers – Noise sources that affect Critical Wildlife Habitat and Wilderness and Roadless areas in the Basin are primarily generated from automobiles, motorized watercraft, aircraft and other recreational activity (TRPA 2011c). Natural events such as thunderstorms, wave slap, and wind can influence noise levels as environmental drivers (TRPA 2011c).

Monitoring Approach – There is currently no established peer-reviewed monitoring plan or protocol for monitoring and

evaluating the CNEL indicator. Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold Standard attainment status was based on a single sample representing a land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates, Inc.). This approach included randomized land use unit sampling within land use categories, and a replicated and intensified sampling effort that spanned multiple 24-hour periods to capture the variation in CNEL.

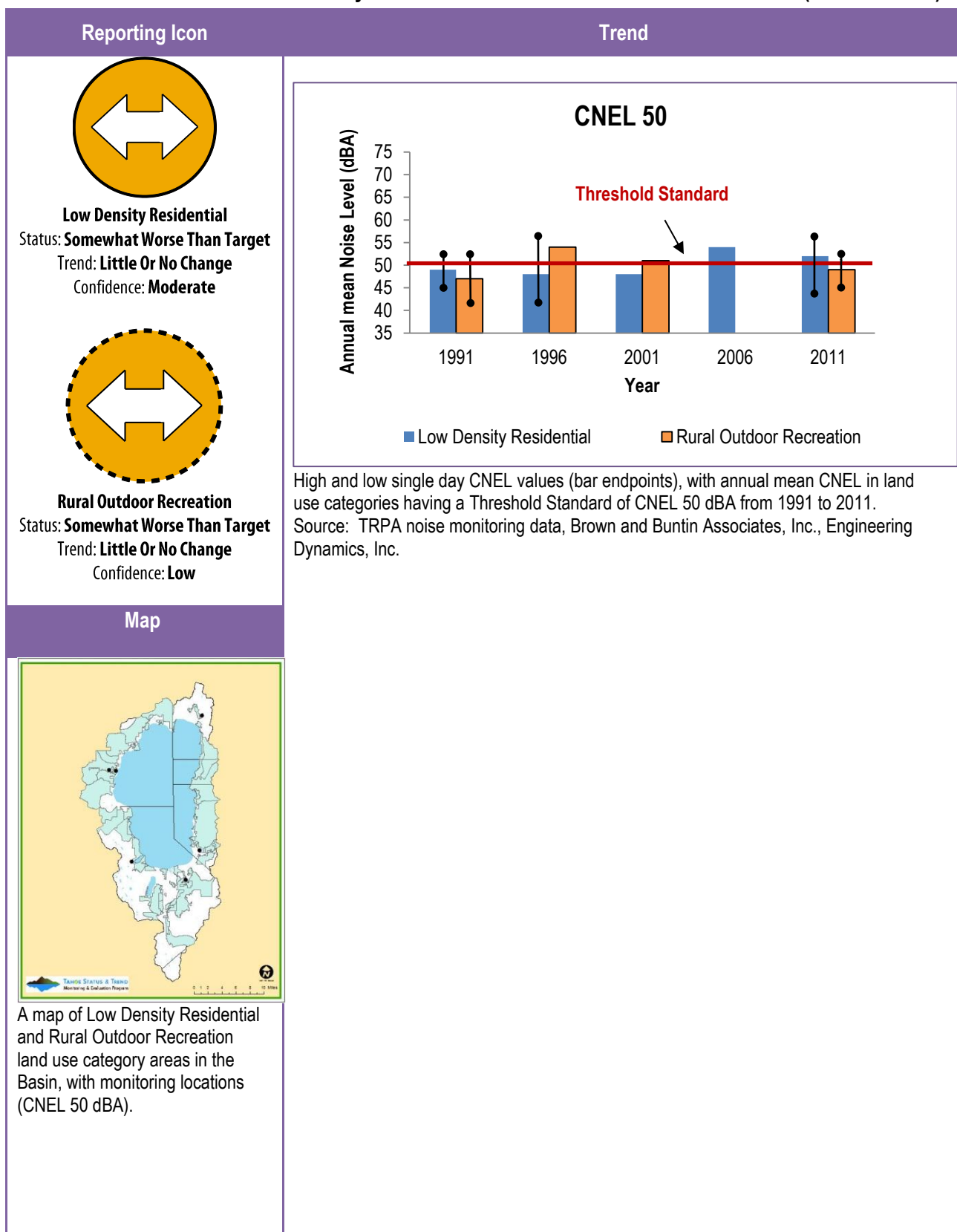
Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service and California State Parks.

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service restricts the use of all motorized and mechanized vehicles within wilderness areas. Also, the U.S. Forest Service, under regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (CFR 1981). In 2004, the Federal Aviation Administration (FAA) released an Advisory Circular (AC) that addressed flights over or near noise-sensitive areas. This document requested that pilots fly at altitudes higher than the minimum permitted by regulation, and on flight paths that will reduce aircraft noise in such areas (FAA 2004). Specifically, the document stated that pilots operating noise-producing aircraft over noise-sensitive areas should make every effort to fly not less than 2,000 feet above ground level, weather permitting (FAA 2004). In addition, the shorezone of Lake Tahoe has noise-related ordinances and regulations in TRPA code. These include a single event noise threshold of 75 dB, as well as a 600 ft. “no-wake zone” shorezone regulation. California State Parks restricts the use of off-highway motorized vehicles in the Basin.

Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Recommendation for Additional Actions – CNEL for the Critical Wildlife Habitat land use category is out of attainment with the adopted Threshold Standard. Enforcement of existing regulations by responsible jurisdictions may aid in reducing CNEL, consistent with adopted Threshold Standards. Enhanced enforcement could include the preparation of a critical wildlife habitat map that could be used as outreach material to educate recreationists or operators of noise-inducing equipment. In addition, an improved monitoring and evaluation plan is needed to guide future CNEL monitoring efforts. It is recommended that this plan be comprised of a peer reviewed standardized methodology, which includes protocol and procedures to be used in noise monitoring efforts Basin-wide.

Cumulative Noise Events: Low Density Residential & Rural Outdoor Recreation Areas (CNEL 50 dBA)



Data Evaluation & Interpretation

Relevance – This indicator measures 24-hour noise levels in the Low-Density Residential and Rural Outdoor Recreation land use categories in the Lake Tahoe Basin. Noise by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, excessive noise levels have the potential to negatively impact community ambiance, one’s recreational experience, and wildlife behavior. In recent years, visitors and residents of the Lake Tahoe Basin have expressed concerns about the decline in serenity of their community, and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007c). In addition to existing federal, state, and local noise control regulations, the Tahoe Regional Planning Agency adopted 24-hour noise Threshold Standards, or Community Noise Equivalent Levels (CNEL), for all land use categories and plan areas of the Basin.

Threshold Category – Noise

Indicator Reporting Category – Cumulative Noise Events-CNEL of 50 dBA, Low Density Residential & Rural Outdoor Recreation Areas

Adopted Standards – For the Low Density Residential and Rural Outdoor Recreation land use category noise levels shall not exceed a CNEL of 50 dBA.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – A-weighted Decibel (dBA). The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Status - Low Density Residential – The Low Density Residential land use category has fluctuated in and out of attainment since 1991 (Engineering Dynamics 1991; TRPA 1996, 2001, 2004). In 2011, an annual mean CNEL value of 52 dBA was measured, ranging from 45 to 58 dBA (TRPA 2011d). A status of “somewhat worse than target” was determined because it was 16% worse than the adopted Threshold Standard.

Status – Rural Outdoor Recreation – Since 1991, the Rural Outdoor Recreation land use category has reported “non-attainment” for 3 sampling periods (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, an annual mean CNEL value of 49 dBA (range 48 to 54 dBA) for Rural Outdoor Recreation areas was measured (TRPA 2011d). A status of “somewhat worse than target” was determined because the indicator was 8% worse than the adopted standard.

Trend – Low Density Residential – The change in CNEL for the Low Density Residential land use category between 1991 and 2011 was +2.4 dBA/year or +0.5% indicating a trend determination of “little or no change.”

Trend – Rural Outdoor Recreation – Since 1991, the change in CNEL for the Rural Outdoor Recreation land use category was +0.01% dBA/year or +0.01% indicating a trend determination of “little or no change.”

Confidence –

Status – Even though 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) additional sampling effort was deployed in 2011, a documented and peer-reviewed protocol for CNEL monitoring does not exist. Consequently, the confidence in the status was determined to be “moderate,” and the spatial and temporal characterization of CNEL across these land use types.

Trend – The confidence in the trend for the Low Density Residential land use category is “moderate” for the analysis of 5 data points with a confidence of 82% and a P value of 0.18. Resulting from the analysis of 4 data points, the confidence in the trend for the Rural Outdoor Recreation land use category is “low” with a confidence of 2% and a P value of 0.98.

Overall Confidence – The overall confidence for the Low Density Residential land use category is “moderate” because there is a “moderate” confidence in both status and trend. The overall confidence for the Rural Outdoor Recreation land use category is “low” because there is “moderate” confidence in status and “low” confidence in trend.

Interim Target – Based on the current trend of both indicators, it appears that conditions will continue to decrease. An interim target was unable to be determined for these indicators.

Target Attainment Date – An interim target was unable to be determined for these indicators.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (TRPA 2011c). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient Basin noise (TRPA 2011c). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (TRPA 2011c).

Monitoring Approach – There is currently no established peer-reviewed monitoring plan or protocol for monitoring and evaluating the CNEL indicator. Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold Standard attainment status was based on a single sample representing a land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates, Inc.), and included randomized land use

unit sampling within land use categories, and a replicated and intensified sampling effort that spanned multiple 24-hour periods to improve the characterization of variation in CNEL.

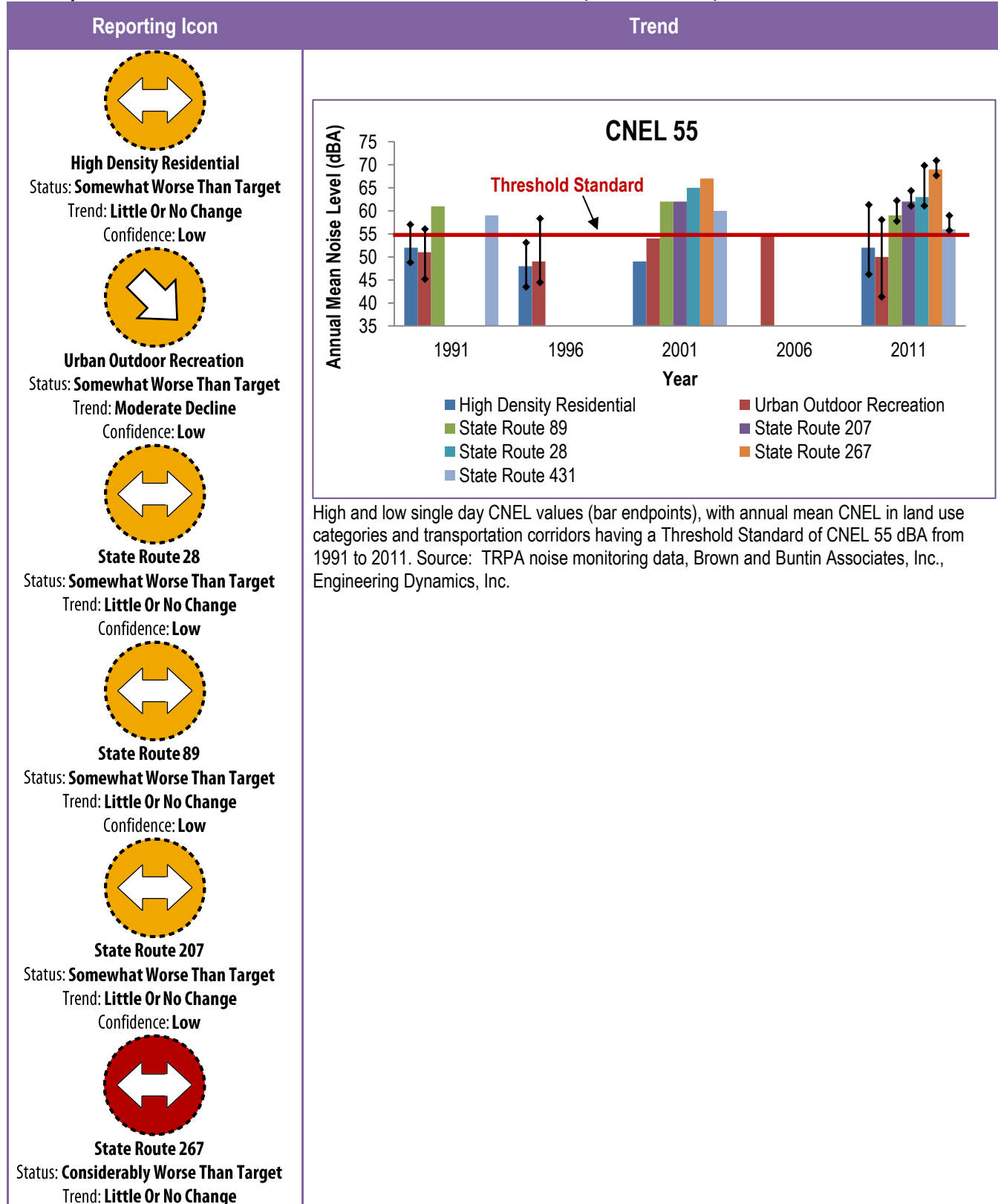
Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service.

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (CFR 1981). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) are required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle not in compliance with Section 27150VC (CHP 2006).

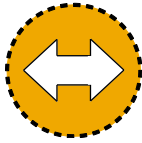
Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Recommendation for Additional Actions – CNEL for both land use categories are out of attainment with the adopted Threshold Standard. Enhanced enforcement of existing regulations by responsible jurisdictions may aid in reducing CNEL consistent with adopted Threshold Standards, such as enforcement of illegal vehicle noise modifications by state and local law enforcement jurisdictions. In addition, an improved monitoring and evaluation plan is needed to guide future CNEL monitoring efforts. It is recommended that this plan be comprised of a peer reviewed standardized methodology, which includes protocol and procedures to be used in noise monitoring efforts Basin-wide.

Cumulative Noise Events: High Density Residential Areas, Urban Outdoor Recreation Areas & Transportation Corridors State Routes 28, 89, 207, 267 & 431 (CNEL 55 dBA)



Confidence: **Low**



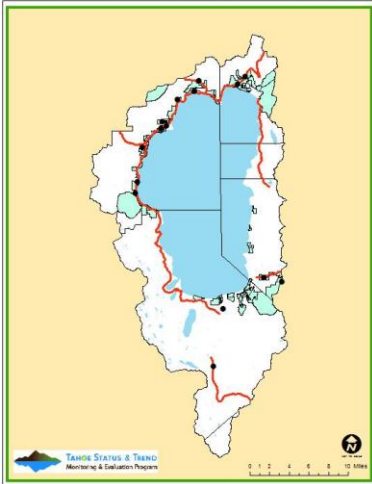
State Route 431

Status: **Somewhat Worse Than Target**

Trend: **Little Or No Change**

Confidence: **Low**

Map



A map of High Density Residential, Urban Outdoor Recreation land use category areas, and transportation corridors of State Routes 28, 89, 207, 267, and 431, with monitoring locations (CNEL 55 dBA).

Data Evaluation & Interpretation

Relevance – This indicator measures 24-hour noise levels in the High Density Residential and Urban Outdoor Recreation land use categories, and State Routes 28, 207, 267, and 431 transportation corridors in the Lake Tahoe Basin. Noise by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, excessive noise levels have the potential to negatively impact community ambiance, one’s recreational experience and wildlife behavior. In recent years, visitors and residents of the Lake Tahoe Basin have expressed concerns about the decline in serenity of their community and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007c). In addition to existing federal, state, and local noise control regulations, an effort to address these noise level impacts, the Tahoe Regional Planning Agency adopted 24-hour noise Threshold Standards, or Community Noise Equivalent Levels (CNEL), for all land use categories, plan areas, and transportation corridors of the Basin.

Threshold Category – Noise

Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, High Density Residential and Urban Outdoor Recreation land use categories, State Routes 28, 89, 207, 267 and 431 Transportation Corridors

Adopted Standards – For the High Density Residential and Urban Outdoor Recreation land use categories and State Routes 28, 89, 207, 267 and 431 transportation corridors, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – A-weighted Decibel (dBA). The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Status – High Density Residential – The High Density Residential land use category has fluctuated in and out of attainment since

1991 (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, an annual mean CNEL value of 52 dBA was measured, ranging from 45 to 62 dBA (TRPA 2011d). A status of “somewhat worse than target” was determined because it was 13% worse than the adopted Threshold Standard.

Status - Urban Outdoor Recreation – Since 1991, the Urban Outdoor Recreation category has also fluctuated in and out of attainment (Engineering Dynamics 1991; TRPA 1996, 2001, 2004). In 2011, an annual mean CNEL value of 50 dBA (range 41 to 59 dBA) for Urban Outdoor Recreation areas was measured (TRPA 2011d). A status of “somewhat worse than target” was determined because it was 7% worse than the adopted Threshold Standard.

Status – State Routes 28, 89, 207, 267 and 431 – From 1991 to 2011, these transportation corridors were minimally sampled, reporting “non-attainment” at every sampling (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, annual mean CNEL for these corridors ranged from 56 to 69 dBA, with a single day value range of 56 to 70 dBA (TRPA 2011d). A status of “somewhat worse than target” was determined for State Routes 28, 89, 207, and 431 because they were 4%-22% worse than the adopted Threshold Standard. A status of “considerably worse than target” was determined for Highway 267 because it was 27% worse than the adopted Threshold Standard.

Trend – High Density Residential – The change in CNEL for the High Density Residential land use category between 1991 and 2011 was +0.05 dBA/year or +0.1% indicating a trend determination of “little or no change.”

Trend – Urban Outdoor Recreation – Since 1991, the change in CNEL for the Urban Outdoor Recreation land use category was +0.08% dBA/year or +0.01% indicating a trend determination of “little or no change.”

Trend – State Routes 28, 89, 207, 267, and 431 – The change in CNEL for these transportation corridors between 1991 and 2011 all indicate a trend determination of “little or no change,” having a CNEL range of +/- 0.2% dBA/year or +/- 0.4%.

Confidence –

Status – 1) Noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected and 3) additional sampling effort was deployed in 2011. Because of these measures, confidence in the status was determined to be “moderate.”

Trend – The confidence in the trend for the High Density Residential land use category is “low” for the analysis of 4 data points with a confidence of 21% and a P value of 0.79. The confidence in the trend for the Urban Outdoor Recreation land use category is “low” for the analysis of 5 data points with a confidence of 31% and a P value of 0.69. The confidence in the trend for the State Routes 28, 89, 207, 267 and 431 transportation corridors is “low” with a confidence range of 45-51% and a P value range of 0.49-0.56.

Overall Confidence – The overall confidence for these land use categories and transportation corridors is “low” because there is “moderate” confidence in status and “low” confidence in trend.

Interim Target – Based on the current trend of the High Density Residential, Urban Outdoor Recreation, and State Routes 267 and 207 categories, it appears as though conditions will continue to decrease, or remain the same (State Route 207). An interim target was unable to be determined for these indicators. Based on current trends, interim targets have been estimated at a five year projection for the following indicators: State Route 28-CNEL 62 dBA; State Route 89-CNEL 59 dBA; and State Route 431-CNEL 56 dBA.

Target Attainment Date – Interim target dates were unable to be determined for the High Density Residential, Urban Outdoor Recreation, and State Routes 267 and 207 categories. Based on current trends, interim target dates for Threshold Standard attainment have been estimated for the following indicators: State Route 28-2052; State Route 89-2055; and State Route 431-2023.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (TRPA 2011c). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient Basin noise (TRPA 2011c). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (TRPA 2011c).

Monitoring Approach – There is currently no established peer-reviewed monitoring plan or protocol for monitoring and evaluating the CNEL indicator. Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold Standard attainment status was based on a single sample representing a land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates, Inc.) and included randomization of land use unit sampling within land use categories, and a replicated and intensified sampling effort that spanned multiple 24-hour periods to improve the characterization of variation in CNEL.

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by U.S. Forest Service and the North Tahoe Public Utility District.

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (CFR 1981). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California

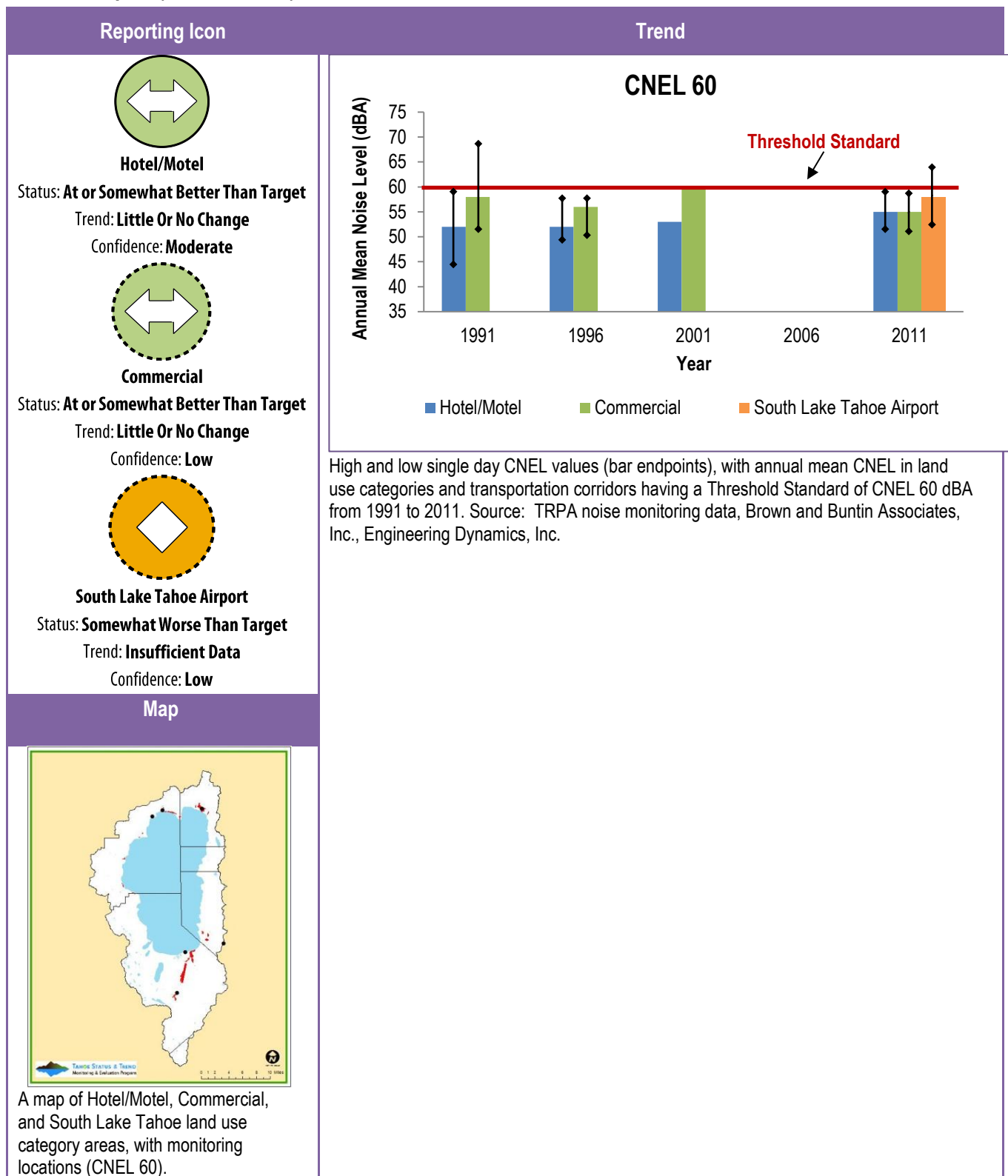
Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle not in compliance with Section 27150VC (CHP 2006).

Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Recommendation for Additional Actions – CNEL for all land use categories and transportation corridors are out of attainment with the adopted Threshold Standard. Enhanced enforcement of existing regulations by responsible jurisdictions (e.g., enforcement of illegal vehicle noise modifications by state and local law enforcement) may aid in reducing CNEL consistent with adopted Threshold Standards. Encouraging low-noise pavement technology for transportation corridor projects may also aid in reducing CNEL values. In addition, a monitoring and evaluation plan is needed to guide future CNEL monitoring efforts. It is recommended that this plan be comprised of a peer reviewed standardized methodology, which includes protocol and procedures to be used in noise monitoring efforts Basin-wide.

Based on the present monitoring record, it is unclear whether the broad scope of CNEL non-attainment status is due to standards that cannot feasibly be achieved under any circumstance because they are inconsistent with other allowed standards and activities within the Regional Plan, or whether the absence of fully reliable measurement protocols are leading to invalid or unreliable conclusions about status, trend, and attainment. Given these uncertainties, the adopted Noise Threshold Standards should be thoroughly evaluated, and necessary changes considered to improve noise Threshold Standards within the Regional Plan's systems.

Cumulative Noise Events: **Hotel/Motel & Commercial Areas & Transportation Corridor South Lake Tahoe Airport (CNEL 60 dBA)**



Data Evaluation & Interpretation

Relevance – This indicator measures 24-hour noise levels in the Hotel/Motel and Commercial land use categories, and the South Lake Tahoe Airport transportation corridor in the Lake Tahoe Basin. Noise by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, excessive noise levels may negatively impact community ambiance, one’s recreational experience, and wildlife behavior. In recent years, visitors and residents of the Lake Tahoe Basin have expressed concerns about declining serenity in their community, and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft, and aircraft (TRPA 2007c). In addition to existing federal, state, and local noise control regulations, the Tahoe Regional Planning Agency adopted 24-hour noise standards, or Community Noise Equivalent Levels (CNEL), for all land use categories, plan areas, and transportation corridors of the Basin.

Threshold Category – Noise

Indicator Reporting Category – Cumulative Noise Events – CNEL of 60 dBA, Hotel/Motel and Commercial land use categories, and South Lake Tahoe Airport Transportation Corridor

Adopted Standards – For the Hotel/Motel and Commercial land use categories and South Lake Tahoe Airport transportation corridors, noise levels shall not exceed a CNEL of 60 dBA.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – A-weighted Decibel (dBA). The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Status – Hotel/Motel – The Hotel/Motel land use category has reported “in-attainment” status since 1991 (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, an annual mean CNEL value of 55 dBA was measured, ranging from 51 to 59 dBA (TRPA 2011d). A status of “at or somewhat better than target” was determined because it was 2% better than the adopted standard.

Status – Commercial – Since 1991, the Commercial land use category has reported “non-attainment” for one sampling period (1991) (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, an annual mean CNEL value of 55 dBA (range 51 to 59 dBA) for Commercial areas was measured (TRPA 2011d). A status of “at or somewhat better than target” was determined because it was 2% better than the adopted standard.

Status – South Lake Tahoe Airport – In 2011, an annual mean CNEL value of 58 dBA (range 51 to 63 dBA) for this category was measured (TRPA 2011d). A status of “somewhat worse than target” was determined because the indicator was 5% worse than the adopted Threshold Standard.

Trend – Hotel/Motel – The change in CNEL for the Hotel/Motel land use category between 1991 and 2011 was +0.16 dBA/year or +0.3% indicating a trend determination of “little or no change.”

Trend – Commercial – Since 1991, the change in CNEL for the Commercial land use category was -0.11% dBA/year or -0.2% indicating a trend determination of “little or no change.”

Trend – South Lake Tahoe Airport – No CNEL data has been collected or reported prior to 2011 for the South Lake Tahoe Airport transportation corridor. Consequently, it was not possible to characterize change in CNEL for this category; the trend was determined to be “unknown” because there was “insufficient data to determine trend.”

Confidence –

Status – Even though 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) additional sampling effort was deployed in 2011, a documented and peer-reviewed protocol for CNEL monitoring does not exist. Consequently, confidence in the status was determined to be “moderate,” because of the spatial and temporal characterization of CNEL across these land use types.

Trend – The confidence in the trend for the Hotel/Motel land use category is “high” for the analysis of 4 data points with a confidence of 97% and a P value of 0.03. The confidence in the trend for the Commercial land use category was determined to be “low” for the analysis of 4 data points with a confidence of 42% and a P value of 0.58. Trend confidence for the South Lake Tahoe Airport transportation corridor was unable to be determined due to the lack of a trend.

Overall Confidence – The overall confidence for the Hotel/Motel land use category is “moderate” because there is “moderate” confidence in status and “high” confidence in trend. The overall confidence for the Commercial land use category is “low” because there is “moderate” confidence in status and “low” confidence in trend. Because there is no trend for the South Lake Tahoe Airport transportation corridor, an overall confidence of “low” was designated.

Interim Target – The Hotel/Motel and Commercial indicators are currently in attainment with Threshold Standards. Therefore, it is not necessary to establish an interim target. Due to an insufficient amount of data, an interim target for the South Lake Tahoe Airport indicator was unable to be determined.

Target Attainment Date – The Hotel/Motel and Commercial indicators are currently in attainment with Threshold Standards. Therefore, it is not necessary to establish an interim target date. Due to an insufficient amount of data, an interim target date for the

South Lake Tahoe Airport indicator was unable to be determined.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (TRPA 2011c). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient Basin noise (TRPA 2011c). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (TRPA 2011c).

Monitoring Approach – There is currently no established peer-reviewed monitoring plan or protocol for monitoring and evaluating the CNEL indicator. Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold Standard attainment status was based on a single sample representing each land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates, Inc.), and included a replicated and intensified sampling effort that spanned multiple 24-hour periods to improve the characterization of variation in CNEL. In addition, CNEL values for the South Lake Tahoe Airport transportation corridor were gathered at the “Barton Beach” site (see indicator summary “Single Noise Event-Aircraft” for site specifics) in lieu of an established CNEL monitoring site at Lake Tahoe Airport.

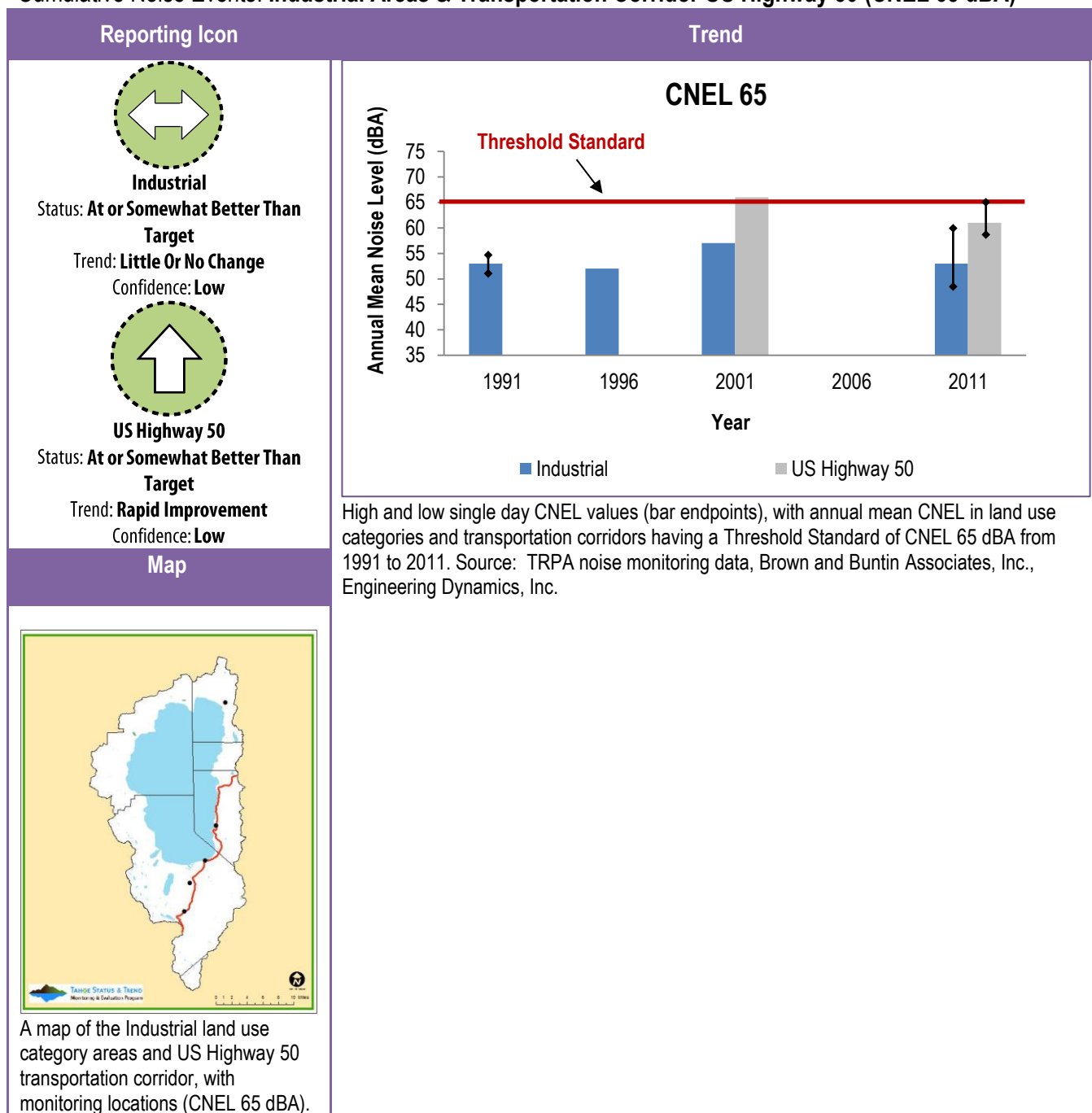
Monitoring Partners – Monitoring was conducted by TRPA with land access granted by U.S. Forest Service and the California Tahoe Conservancy.

Programs and Actions Implemented to Improve Conditions – The City of South Lake Tahoe has published noise abatement guidelines on the South Lake Tahoe Airport website for all pilots. These guidelines pertain to aircraft flight paths, and for low altitude departures and approaches over environmentally sensitive and residential areas.

Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Recommendation for Additional Actions – CNEL for the South Lake Tahoe Airport transportation corridor is out of attainment with the adopted Threshold Standard. Additional aircraft noise mitigation measures may be necessary to reduce CNEL, consistent with adopted Threshold Standards. For example, further restricting aircraft type, flight frequency and/or the time of day aircraft are allowed to take-off and land may aid in mitigating aircraft noise. Although there is an established monitoring plan for single noise events for aircraft at the Lake Tahoe Airport, there is currently no mutually established protocol for evaluating CNEL at the Airport. Therefore, the development of a monitoring and evaluation plan for the Lake Tahoe Airport is needed to guide future CNEL monitoring efforts. Further, the feasibility of meeting currently adopted CNEL (or single event) noise Threshold Standards for the Airport is uncertain and should be evaluated. Based on the evaluation, Threshold Standards should be considered for adjustment consistent with FAA, TRPA, and airport permit requirements. Modified Threshold Standards, if any, should be addressed and incorporated in updates to the Airport Master Plan.

Cumulative Noise Events: Industrial Areas & Transportation Corridor US Highway 50 (CNEL 65 dBA)



Data Evaluation & Interpretation

Relevance – This indicator measures 24-hour noise levels in the Industrial land use category and the US Highway 50 transportation corridor in the Lake Tahoe Basin. Noise by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, noise management is an integral part of land use planning and environmental improvement processes at Lake Tahoe. Visitors and residents have expressed concerns about the decline in serenity of their community and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007c). In addition to existing federal, state, and local noise control regulations, an effort to address these noise level impacts, the Tahoe Regional Planning Agency adopted 24-hour noise Threshold Standards, or Community Noise Equivalent Levels (CNEL), for

all land use categories and plan areas of the Basin.

Threshold Category – Noise

Indicator Reporting Category – Community Noise Equivalent Level - 65 dBA, Industrial Land Use Category and US Highway 50 Transportation Corridor

Adopted Standards – For the Industrial land use category and US Highway 50 transportation corridor, noise levels shall not exceed a CNEL of 65 dBA.

Type of Standard – Numerical Standard

Indicator (Unit of Measure) – A-weighted Decibel (dBA). The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Status – Industrial – The Industrial land use category has reported “in-attainment” status since 1991 (Engineering Dynamics 1991; TRPA 1996, 2001). In 2011, an annual mean CNEL value of 53 dBA was measured, ranging from 52 to 58 dBA (TRPA 2011d). A status of “at or somewhat better than target” was determined because it was 11% better than the adopted standard.

Status – US Highway 50 – The US Highway 50 transportation corridor reported “non-attainment” for one sampling period (2001) in a total of 2 sampling periods (TRPA 2001). In 2011, an annual mean CNEL value of 61 dBA (range 58 to 65 dBA) for the US Highway 50 transportation corridor was measured (TRPA 2011d). A status of “at or somewhat better than target” was determined because it met the adopted Threshold Standard (neither worse nor better).

Trend – Industrial – The change in CNEL for the Industrial land use category between 1991 and 2011 was +0.04 dBA/year or +0.3% indicating a trend determination of “little or no change.”

Trend – US Highway 50 – Since 1991, the change in CNEL for the US Highway 50 transportation corridor was -0.5% dBA/year or -3.8% indicating a trend determination of “rapid improvement.”

Confidence –

Status – Even though 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) additional sampling effort was deployed in 2011, a documented and peer-reviewed protocol for CNEL monitoring does not exist. Consequently, the confidence in the status was determined to be “moderate,” because of the spatial and temporal characterization of CNEL across these land use types.

Trend – The confidence in the trend for the Industrial land use category is “low” for the analysis of 4 data points with a confidence of 15% and a P value of 0.85. Trend confidence in the trend for the US Highway 50 transportation corridor is automatically assigned “low” due to the lack of statistical trend analysis (only 2 data points).

Overall Confidence – The overall confidence for the Industrial land use category is “low” because there is “moderate” confidence in status and “low” confidence in trend. The overall confidence for the US Highway 50 transportation corridor is “low” because there is “moderate” confidence in status and “low” confidence in trend.

Interim Target – The Industrial land use category and US Highway 50 transportation corridor indicators are currently in attainment with Threshold Standards and therefore it is not necessary to establish an interim target.

Target Attainment Date – The Industrial land use category and US Highway 50 transportation corridor indicators are currently in attainment with Threshold Standards and therefore it is not necessary to establish an interim target date.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft and recreational activity (TRPA 2011c). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient Basin noise (TRPA 2011c). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (TRPA 2011c).

Monitoring Approach – There is currently no established peer-reviewed monitoring plan or protocol for monitoring and evaluating the CNEL indicator. Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold Standard attainment status was based on a single sample representing a land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates, Inc.), and included randomization of land use unit sampling within land use categories, and a replicated and intensified sampling effort that spanned multiple 24-hour periods to improve the characterization of variation in CNEL.

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by U.S. Forest Service.

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (CFR 1981). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other restrictions, enforced by the California Highway Patrol (CHP) under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle not in compliance with Section 27150VC (CHP 2006).

Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Recommendation for Additional Actions – Although the Industrial land use category and US Highway 50 transportation corridor are in-attainment with the adopted standards, an improved monitoring and evaluation plan is needed to guide future CNEL monitoring efforts. It is recommended that this plan have a peer reviewed standardized methodology, which includes protocol and procedures to be used in noise monitoring efforts Basin-wide.

Summary Evaluation of Adopted Policy Statement: Establish CNEL Levels for Transportation Corridors

Relevance – Noise by definition, is “unwanted sound,” and is therefore a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, excessive noise levels have the potential to negatively impact community ambiance, one’s recreational experience, and wildlife behavior. Based on data from previous noise research, primary drivers of noise levels in the Basin have been attributed to anthropogenic activities and actions. More specifically, noise levels from major transportation corridors and the airport have been identified as the main sources.

Cumulative noise, or Community Noise Equivalent Level (CNEL), is a noise level value that is based upon the weighted average of all measured noise over a 24-hour period. As a component of the Cumulative Noise Events Indicator Reporting Category in TRPA Resolution 82-11, the Governing Board adopted a policy statement to establish CNEL for transportation corridors. The policy statement provides, “it shall be a policy of TRPA Governing Body in development of the Regional Plan to define, locate, and establish CNEL levels for transportation corridors” (TRPA, Resolution 82-11, Exhibit A).

Type of Standard – Policy Statement

Evaluation Criteria – This Policy Statement was evaluated by determining whether the agency has met two criteria, first the adoption of a definition for transportation corridors, and second, a determination of whether the agency has established CNELs (Community Noise Equivalent Level) for transportation corridors. The policy statement does not direct the agency specifically to adopt CNEL Threshold Standards for transportation corridors.

Interim Target – None, the Threshold Standard is currently in attainment.

Target Attainment Date – None, the Threshold Standard is currently in attainment.

Attainment Status – The Threshold Standard is in attainment. A review of the current adopted policies for Cumulative Noise Events, pertaining specifically to transportation corridors, supports the conclusion of implementation of the Policy Statement. TRPA has adopted definitions for Transportation Corridors, and has adopted recommended CNEL for transportation corridors in TRPA’s Goals and Policies (1986). In addition, CNELs for transportation corridors are listed geographically in TRPA Plan Area Statements.

1. Development of transportation corridor definition:
Attainment of this Policy Statement is supported by having identified all of the major transportation highways and routes within the Basin as within the definition of a “transportation corridor” and these corridors as a component in the noise sub element of the 1986 Regional Plan Goals and Policies. These road designations include US Highway 50, and State Routes 28, 89, 207, 267, 431, and South Lake Tahoe Airport (TRPA 1986). Reference to recommended CNELs is also documented in applicable Plan Area Statements (TRPA 1987b).
2. Establishment of CNEL levels for transportation corridors:
Recommended CNEL have been adopted for all major transportation corridors in the Basin (TRPA 1986 – Goals and Policies). CNEL for each transportation corridor are recommended as

follows: US Highway 50 (65 dBA); State Routes 89, 207, 28, 267 and 431 (55 dBA); and South Lake Tahoe Airport (60 dBA) (TRPA 1986). The 1986 Goals and Policies also established a geographic limitation of these average noise levels “...to an area within 300 feet from the edge of the road” (TRPA 1986). The Goals and Policies further define average noise levels for the South Lake Tahoe Airport transportation corridor, which “...applies to areas impacted by the approved flight paths” (TRPA 1986).

Recommendation for Additional Actions – Based on the review of current TRPA policy, it appears that TRPA has sufficiently taken action to support the adopted Policy Statement. The development of an improved Cumulative Noise Level monitoring program is recommended to supplement future management policy decisions regarding transportation corridor noise level. This plan should be comprised of accepted and standardized field and analysis methods, which includes protocol and procedures to be used in noise monitoring efforts Basin-wide.